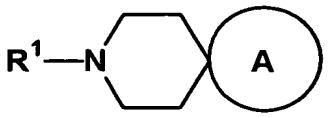
CLAIMS

1. A spiro-piperidine compound represented by formula (I):



(I)

wherein R^1 represents hydrogen, an aliphatic hydrocarbon group which may have a substituent(s) or a cyclic group which may have a substituent(s); and

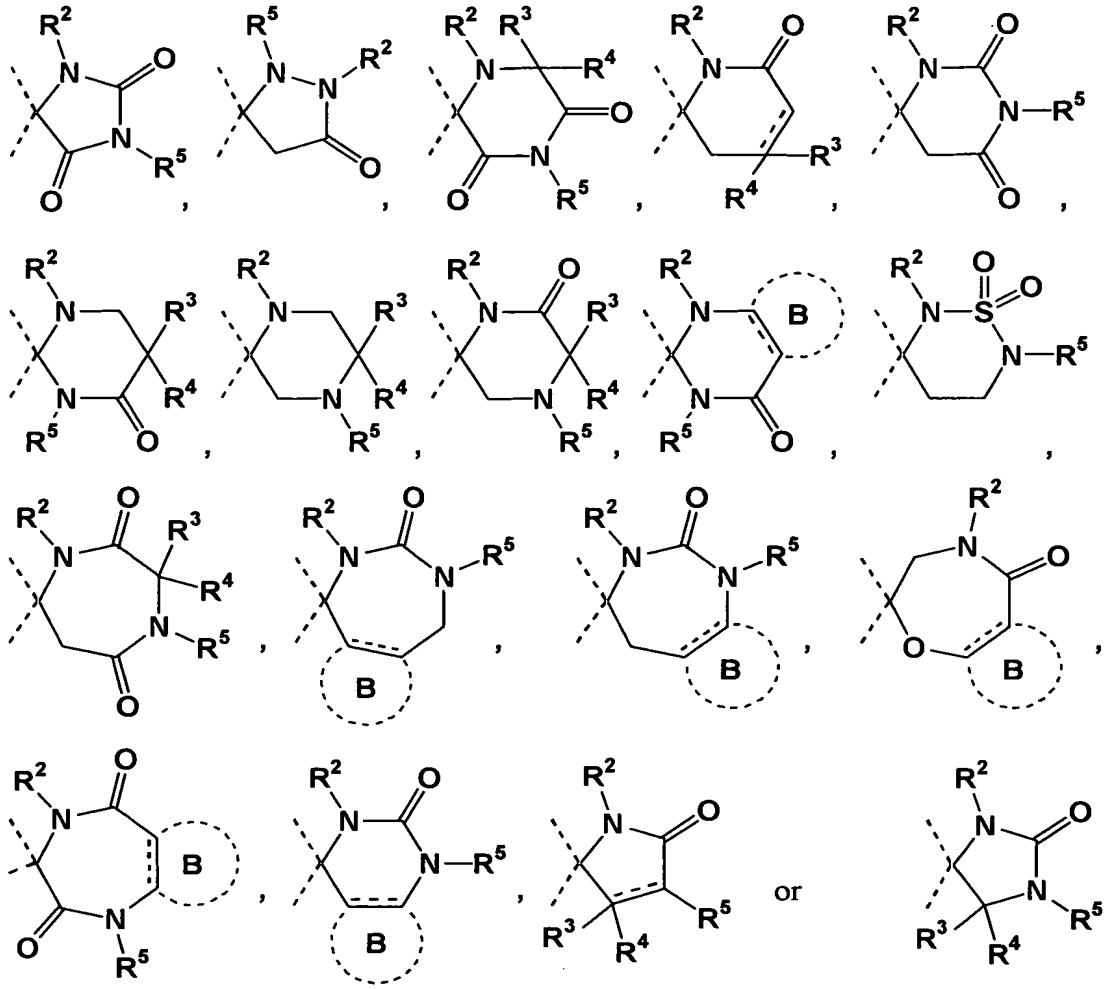
ring A represents a 5- to 8-membered cyclic group which may have a substituent(s), in which 2,5-diketopiperazine having a spiro bond at the 3-position is excluded, ring A may be further condensed with ring B, and ring B represents a 3- to 8-membered monocyclic carbon ring or hetero ring which may have a substituent(s),

a salt thereof, an N-oxide thereof, a quaternary ammonium salt thereof or a solvate thereof, or a prodrug thereof.

2. The spiro-piperidine compound according to claim 1, wherein the ring A is a 5- to 8-membered hetero ring which may have a substituent(s), a salt thereof, an N-oxide thereof, a quaternary ammonium salt thereof or a solvate thereof, or a prodrug thereof.

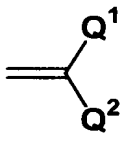
3. The spiro-piperidine compound according to claim 2, wherein the ring A is a 5- to 8-membered nitrogen-containing hetero ring which may have a substituent(s), a salt thereof, an N-oxide thereof, a quaternary ammonium salt thereof or a solvate thereof, or a prodrug thereof.

4. The spiro-piperidine compound according to claim 3, wherein the ring A is represented by



wherein ---- represents a single bond or a double bond; and

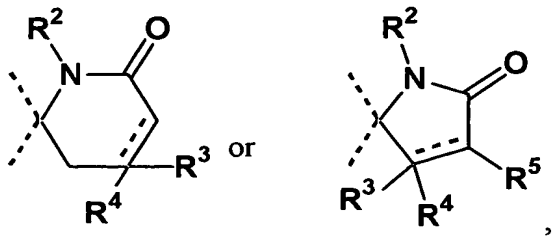
R^2, R^3, R^4 and R^5 each independently represents hydrogen, an aliphatic hydrocarbon group which may have a substituent(s), hydroxyl which may be protected, carboxy which may be protected, carbamoyl which may be protected, or a cyclic group which may have a substituent(s), or R^3 and R^4 are taken together to represent



wherein Q^1 and Q^2 each independently represents hydrogen, an aliphatic hydrocarbon group which may have a substituent(s), hydroxyl which may be protected, carboxy which may be protected, carbamoyl which may be protected, or a cyclic group which may have a substituent(s); and

ring B represents a 3- to 8-membered monocyclic carbon ring or hetero ring which may have a substituent(s), and

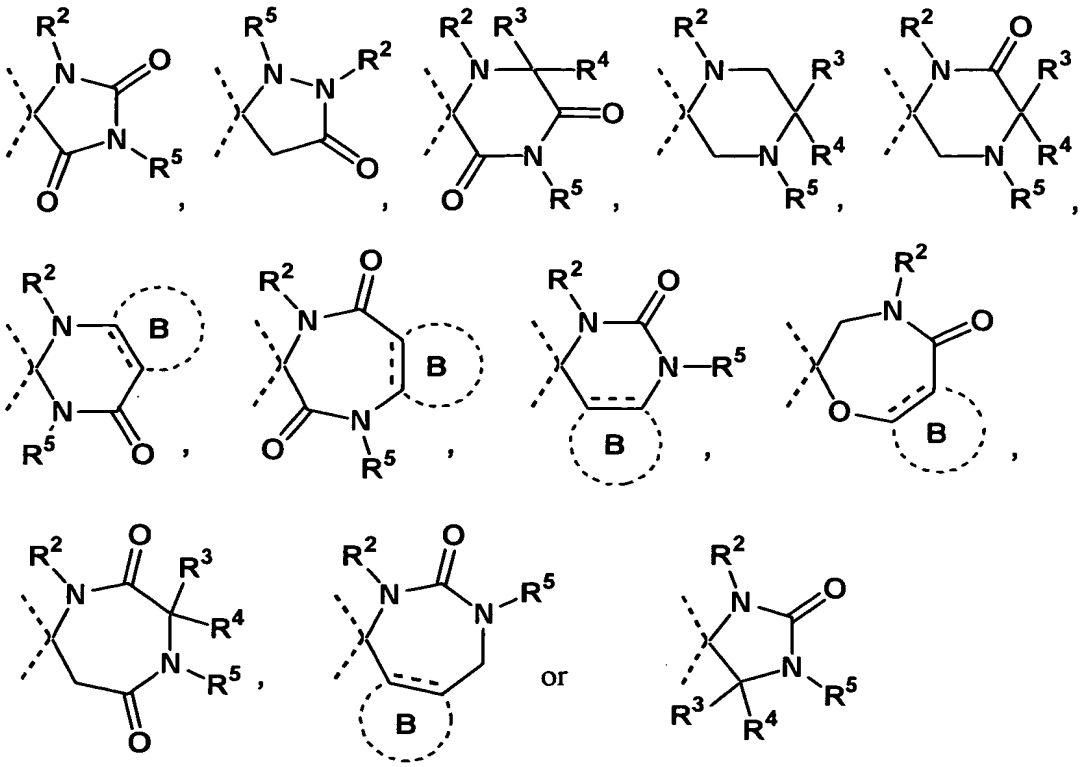
wherein when ring A represents



R^4 is present so long as ---- represents a single bond,

a salt thereof, an N-oxide thereof, a quaternary ammonium salt thereof or a solvate thereof, or a prodrug thereof.

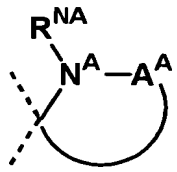
5. The spiro-piperidine compound according to claim 4, wherein the ring A is represented by



wherein all symbols have the same meanings as those defined in claim 4,

a salt thereof, an N-oxide thereof, a quaternary ammonium salt thereof or a solvate thereof, or a prodrug thereof.

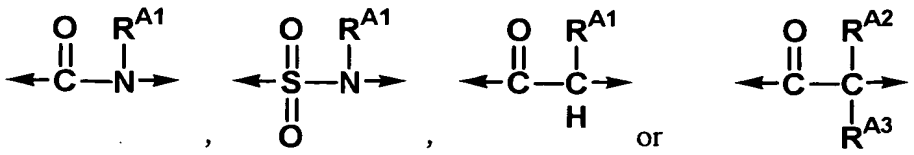
6. The spiro-piperidine compound according to claim 3, wherein the ring A is represented by



wherein N^A represents nitrogen;

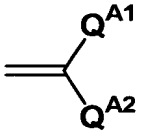
R^{NA} represents an aliphatic hydrocarbon group which may have a substituent(s), hydroxyl which may be protected, carboxy which may be protected, carbamoyl which may be protected, or a cyclic group which may have a substituent(s); and

A^A represents



wherein arrow represents a position capable of binding to N^A;

R^{A1}, R^{A2} and R^{A3} each independently represents an aliphatic hydrocarbon group which may have a substituent(s), hydroxyl which may be protected, carboxy which may be protected, carbamoyl which may be protected, or a cyclic group which may have a substituent(s), or R^{A2} and R^{A3} are taken together to represent



wherein Q^{A1} and Q^{A2} each independently represents hydrogen, an aliphatic hydrocarbon group which may have a substituent(s), hydroxyl which may be protected, carboxy which may be protected, carbamoyl which may be protected, or a cyclic group which may have a substituent(s), and wherein at least one of Q^{A1} and Q^{A2} does not represent hydrogen,

a salt thereof, an N-oxide thereof, a quaternary ammonium salt thereof or a solvate thereof, or a prodrug thereof.

7. The spiro-piperidine compound according to claim 1, wherein R^1 is a C1-10 aliphatic hydrocarbon group which may have a substituent(s), a salt thereof, an N-oxide thereof, a quaternary ammonium salt thereof or a solvate thereof, or a prodrug thereof.

8. The spiro-piperidine compound according to claim 1, wherein R^1 is a 5- to 10-membered monocyclic or bicyclic cyclic group which may have a substituent(s), a salt thereof, an N-oxide thereof, a quaternary ammonium salt thereof or a solvate thereof, or a prodrug thereof.

9. The spiro-piperidine compound according to claim 1, wherein R^1 is alkyl having from 1 to 6 carbon atoms susbtituted with a 3- to 10-membered monocyclic or bicyclic cyclic group which may have a substituent(s), a salt thereof, an N-oxide thereof, a quaternary ammonium salt thereof or a solvate thereof, or a prodrug thereof.

10. A pharmaceutical composition which comprises the spiro-piperidine compound according to claim 1, a salt thereof, an N-oxide thereof, a quaternary ammonium salt thereof or a solvate thereof, or a prodrug thereof.

11. The pharmaceutical composition according to claim 10, which is a chemokine receptor antagonist.

12. The pharmaceutical composition according to claim 11, wherein the chemokine receptor is CCR5.

13. The pharmaceutical composition according to claim 10, which is a preventive and/or therapeutic agent for human immunodeficiency virus infection.

14. The pharmaceutical composition according to claim 10, which is a preventive and/or therapeutic agent for acquired immunodeficiency syndrome.

15. The pharmaceutical composition according to claim 10, which is a morbid state progress inhibitor for acquired immunodeficiency syndrome.

16. The pharmaceutical composition according to claim 11, wherein the chemokine receptor is CCR2.

17. The pharmaceutical composition according to claim 10, which is a preventive and/or therapeutic agent for arteriosclerosis or nephropathy.

18. A medicament which comprises a combination of the spiro-piperidine compound according to claim 1, a salt thereof, an N-oxide thereof, a quaternary ammonium salt thereof or a solvate thereof, or a prodrug thereof with one or at least two of agents selected from protease inhibitors, reverse transcriptase inhibitors, integrase inhibitors, fusion inhibitors and/or chemokine inhibitors.

19. A method for preventing and/or treating diseases caused by CCR5 or CCR2 in a mammal, which comprises administering to a mammal an effective amount of the spiro-piperidine compound according to claim 1, a salt thereof, an N-oxide thereof, a quaternary ammonium salt thereof or a solvate thereof, or a prodrug thereof.

20. Use of the spiro-piperidine compound according to claim 1, a salt thereof, an N-oxide thereof, a quaternary ammonium salt thereof or a solvate thereof, or a prodrug thereof for the manufacture of a preventive and/or therapeutic agent for diseases caused by CCR5 or CCR2.